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Re:		**CC:**	

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Comments:

Dear Examiner :

Please consider the following arguments and proposals (see the attachment) for the telephone interview on Tuesday, March 22, 2011, at 10:00am.

Please contact me at 703-205-8075 if you have any question.

Thank you.

Cheng-Kang Hsu (#61,007)

(A). Proposed Amendments to the Claims

1. (Currently Amended) An external pressure type hollow fiber membrane module of an external pressure type having a membrane occupying rate set to between 0.3 to 0.6, comprising:

a hollow fiber membrane bundle formed of a plurality of hollow fiber membranes,

a cylindrical housing, and

a nozzle for allowing a fluid to enter into and exit therefrom,

wherein the hollow fiber membranes are adhesively-fixedly adhered to each other and to the inner wall of the housing at ends of the hollow fiber membrane bundle and form a membrane chargeable region in the inner side of the adhesively-fixed ends;

wherein a hollow part is opened in one side or both sides of the adhesively-fixed ends; and wherein the nozzle for allowing the fluid to enter and exit therefrom is installed on a side face of the housing of at least one adhesively-fixed end at which the hollow part is opened;

wherein a membrane-occupying rate in the housing is set at 0.3 to 0.6, [[and]]

wherein a ratio PB/PA of membrane-occupying rates is 0.50 or more but 0.95 or less when each of PA and PB is defined as the membrane-occupying rate in a neighboring region (A) of the nozzle and a non-neighboring region (B) of the nozzle which includes all regions other than neighboring region (A) in the membrane chargeable region in the inner side of an adhesively-fixed end of the opened hollow part,

wherein a partial portion of a circumference of a hollow fiber membrane bundle is within the neighboring region (A), and the rest of the circumference of the hollow fiber membrane bundle is within the non-neighboring region (B), the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle, and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle.

2. (Currently Amended) An external pressure type hollow fiber membrane module of an external pressure type having a membrane occupying rate set to between 0.3 to 0.6, comprising: a hollow fiber cartridge having a hollow fiber membrane bundle formed of a plurality of hollow fiber membranes, of which both end parts are adhesively-fixed and hollow parts in at least one end of adhesively-fixed ends are opened and form a membrane chargeable region in the inner side of the adhesively-fixed ends; and

a cylindrical housing accommodating the cartridge and having a nozzle for allowing a fluid to enter and exit therefrom installed on at least one side face, in which the nozzle installed is fixed so as to be placed in the vicinity of the inner surface of an adhesively-fixed part in the opened hollow parts side in the hollow fiber membrane cartridge;

wherein a membrane-occupying rate in the housing is set at 0.3 to 0.6, [[and]]

wherein a ratio PB/PA of membrane-occupying rates is 0.50 or more but 0.95 or less when each of PA and PB is defined as the membrane-occupying rate in a neighboring region (A) of the nozzle and a non-neighboring region (B) of the nozzle

which includes all regions other than the neighboring region (A) in the membrane chargeable region in the inner side of an adhesively-fixed end of the opened hollow part, and

wherein a partial portion of a circumference of a hollow fiber membrane bundle is within the neighboring region (A), and the rest of the circumference of the hollow fiber membrane bundle is within the non-neighboring region (B), the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle, and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle.

3. (Previously Presented) The external pressure type hollow fiber membrane module according to claim 1 or 2, wherein in the neighboring region (A) of the nozzle, among a membrane chargeable region in the inner side of an adhesively-fixed part, membrane occupying-rate PC is 0.5 times or more but 2.0 times or less with reference to membrane-occupying rate PA in the neighboring region (A), in every unit region (C) constituting the neighboring region (A).

4. (Previously Presented) The external pressure type hollow fiber membrane module according to claim 1 or 2, wherein PB includes region PB1 and PB2, and wherein PA, PB1 and PB2 of the membrane-occupying rates have the relation of PA $\geq$ PB1 $\geq$ PB2 and further PA is 0.40 or more but 0.60 or less and PB2 is 0.20 or more but less than 0.40 when each of PB1 and PB2 is defined as a membrane-occupying rate in a first non-neighboring region (B1) and a second non-neighboring region (B2) in the non-neighboring region (B) of the nozzle among the membrane chargeable region in the inner side of an adhesively-fixed part and

wherein the non-neighboring region (B1) is located in a side close to the nozzle and wherein the non-neighboring region (B2) is located in a side distant from the nozzle.

5. (Previously Presented) The external pressure type hollow fiber membrane module according to claim 1, wherein the non-neighboring region (B) of the nozzle among the membrane chargeable region in the inner side of an adhesively-fixed part includes at least one unit region in which membrane-occupying rate PC in unit region (C) constituting the non-neighboring region (B) is less than 0.5 times with reference to the membrane-occupying rate PB in the non-neighboring region (B).

6. (Original) The external pressure type hollow fiber membrane module according to claim 1 or 2, wherein a current plate is arranged in the vicinity of the nozzle of outer circumference parts of the hollow fiber membrane bundle.

7. (Original) The external pressure type hollow fiber membrane module according to claim 6, wherein the current plate is cylindrical, accommodates the hollow fiber membrane bundle inside of it, has a plurality of through-holes in a wall surface except the vicinity of the nozzle, and has no through-hole in the vicinity of the nozzle.

8. (Previously Presented) The external pressure type hollow fiber membrane module according to claim 1 or 2, wherein an adhesive bond part constituting the adhesively-fixed part is made of a single layer of a high polymer material, and has the hardness of 50A to 70D in a range of operating temperatures.

9. (Withdrawn) A method for manufacturing the external pressure type hollow fiber membrane module according to claim 1 or 2 including: previously inserting a plurality of columnar materials into an end of a hollow fiber membrane bundle at least in a side of making a hollow part opened; accommodating the hollow fiber membrane bundle which keeps the state of the insertion in a vessel for forming an adhesively-fixed part; injecting an adhesive bond into the vessel and curing it; then cutting an end face of the hollow fiber membrane bundle to form the adhesively-fixed part; and consequently making the columnar materials having a length of 0.3 to 0.9 times with reference to a thickness of the adhesively-fixed part exist at least in the adhesively-fixed part of a neighboring region (A).

10. (Withdrawn) A method for manufacturing the external pressure type hollow fiber membrane module according to claim 1 including: accommodating a hollow fiber membrane bundle in a housing case having a nozzle for allowing a fluid to enter and exit therefrom at least on one side face; horizontally rotating the housing case in a state of keeping the nozzle directing toward a lower direction than a horizontal direction; injecting an adhesive bond into the housing case under the centrifugal force; and curing it to form an adhesively-fixed part.

11. (Currently Amended) An external pressure type hollow fiber membrane module of an external pressure type having a membrane occupying rate ~~normally~~ set to between 0.3 to 0.6, comprising:

a cylindrical housing;

a hollow fiber membrane bundle formed of a plurality of hollow fiber membranes located inside of the cylindrical housing;

a nozzle for allowing a fluid to enter into and exit from the housing, located on a side wall of the cylindrical housing

wherein the membrane bundle extends across the cylindrical housing and is separated in cross-section into two regions, a first region taking up at least one fourth of a cross-sectional area of the membrane bundle located between a portion of the wall of the cylinder that extends about the nozzle to approximately the center of the cylinder, and a second region that extends from the first region to the side of the wall of the cylinder that is opposite to the side of the wall in which the nozzle is located, [[and]]

wherein a ratio PB/PA of membrane-occupying rates is 0.50 or more but 0.95 or less when PA is defined as the membrane-occupying rate in the first region, and PB is defined as the membrane-occupying rate in the second region, [[and]]

wherein the membrane occupying rate in the housing is between 0.3 to 0.6; and

wherein a partial portion of a circumference of a hollow fiber membrane bundle is within the first region, and the rest of the circumference of the hollow fiber membrane bundle is within the second region, the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber

membrane bundle, and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle.

12. (Currently Amended) An external pressure type hollow fiber membrane module of an external pressure type having a membrane occupying rate ~~normally~~ set to between 0.3 to 0.6, comprising:

a rod-shaped bundle of hollow fiber membranes formed of a plurality of hollow fiber membranes,

a cylindrical housing, and

a nozzle for allowing a fluid to enter into and exit from the housing,

the hollow fiber membranes being fixedly adhered to each other and to the inner wall of the housing at ends of the hollow fiber membrane bundle;

a hollow part opened in one side or both sides of adhesively-fixed ends of the hollow fiber membrane; and

wherein the nozzle for allowing the fluid to enter and exit therefrom is installed on a side face of the housing of at least one adhesively-fixed end at which the hollow part is opened;

wherein the rod-shaped bundle of hollow fiber membranes extends across the cylindrical housing and has a has a neighboring region (A) having a cross-sectional area that surrounds the nozzle and extends from the nozzle approximately half way to a side of the cylindrical housing opposite to the nozzle, and a non-neighboring region (B) of the nozzle which has a cross-sectional area that encompasses a cross-sectional area of the cylindrical housing other than that cross-sectional area encompassed by neighboring region (A), [[and]]

wherein the membrane occupying rate in the housing is between 0.3 and 0.6, and

wherein a partial portion of a circumference of a hollow fiber membrane bundle is within the neighboring region (A), and the rest of the circumference of the hollow fiber membrane bundle is within the non-neighboring region (B), the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle, and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle.

(B). Rejections & Arguments

Claim Rejections Under 35 U.S.C. §112

Claims 11 and 12 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

In view of the foregoing amendments, it is respectfully submitted that this rejection has been addressed. Accordingly, all pending claims are now definite and clear. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, second paragraph, are therefore respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 11 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Haworth, U.S. Patent No. Re. 36,125. Claims 1-5, 11 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Bovin, U.S. Patent Application Publication No. 2002/0079260, in view of Haworth. Claims 6 and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Bovin in view of Haworth, and further in view of Misao, JP 62204804. Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Bovin in view of Haworth, and further in view of Walker, U.S. Patent No. 5,282,966. These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not being repeated here.

In light of the foregoing amendments, Applicant respectfully submits that this rejection has been obviated and/or rendered moot. While not conceding to the Examiner's rejection, but merely to expedite prosecution, as the Examiner will note, independent claims 1, 2, 11 and 12 have been amended.

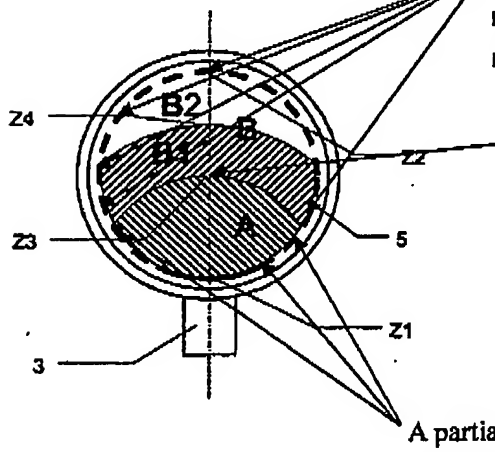
Independent claim 1, 2 and 12 now recite a combination of elements including "a partial portion of a circumference of a hollow fiber membrane bundle is within the neighboring region (A), and the rest of the circumference of the hollow fiber membrane bundle is within the non-neighboring region (B), the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle, and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle."

Independent claim 11 now recites a combination of elements including "a partial portion of a circumference of a hollow fiber membrane bundle is within the first region, and the rest of the circumference of the hollow fiber membrane bundle is within the second region, the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle, and the membrane-occupying rate at the rest of the circumference

of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle."

Support for the amendments to claims 1, 2, 11 and 12 can be found at least in FIG. 2 and the corresponding description of the specification as originally filed.

FIG. 2



The rest of the circumference of the hollow fiber membrane bundle that is within the non-neighboring region (B)

The center of the hollow fiber membrane bundle

A partial portion of the circumference of the hollow fiber membrane bundle that is within the neighboring region (A)

In particular, as embodied in FIG. 2 (see above) of the present application, the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle (i.e., PA) is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle (i.e., PB2), and the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle (i.e., PB2) is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle (i.e., at the boundary of PA and PB1).

Applicant respectfully submits that the combinations of elements set forth in claims 1, 2, 11 and 12 are not disclosed or suggested by the references relied on by the Examiner.

Haworth

In particular, Haworth in col. 3, lines 12-27 discloses:

> Alternatively, the inner average packing fraction may be similarly defined along a radius beginning at said region of the hollow fiber bundle adjacent to the core and extending along said radius twenty-five percent outward toward the region of the hollow fiber bundle adjacent to the housing. The outer average packing fraction may be similarly defined along said radius beginning at said region of

> the hollow fiber bundle adjacent to the housing and extending along said radius twenty-five percent inward toward the region of the hollow fiber bundle adjacent to the core. Under these definitions, the inner average packing fraction may be less than the outer average packing fraction. Specifically, the inner average packing fraction may be within the range of sixty to ninety-five percent of the outer average packing fraction. (Emphasis added.)

In other words, Haworth simply discloses that the inner average packing fraction may be less than the outer average packing fraction, which means that the average packing fraction at the circumference of the hollow fiber bundle will be higher than the packing fraction at the center of the hollow fiber bundle. Unlike Haworth, in the present invention, the membrane-occupying rate at some portion (i.e., at the rest of the circumference of the hollow fiber membrane bundle within the non-neighboring region (B)) is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle. Therefore, Haworth fails to teach "the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle" as recited in claims 1, 2 and 12, and "the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle" as recited in claim 11.

In addition, Haworth simply discloses that the inner average packing fraction may be less than the outer average packing fraction without suggesting that the packing fraction at different portions of the circumference is different. Therefore, Haworth also fails to teach "the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle" as recited in claims 1, 2 and 12, and "the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle" as recited in claim 11.

Bovin

Bovin in paragraph [0080] discloses:

> The displacement of the two carriages 30 that guide the fibres 40 towards the troughs 23 with a constant circumferential speed and a

> variable amplitude influences the structure of the bundle of hollow fibres. The density of the fibres disposed in the trough is inversely proportional to the amplitude of the displacement of the carriages 30: the smaller the displacement amplitude, the higher the density of the fibres placed in the troughs 23. The fibre-guiding step contributes towards heterogeneous distribution of the hollow fibres with a higher fibre density in certain parts of the bundle. In this case, **the bundles of hollow fibres**, after they have satisfied the conditions regarding the time variation of the amplitude of the reciprocating motion of the guide carriages 30 indicated in FIG. 4, **have a higher density at the periphery compared with the density at the centre (see FIG. 5).** Further, each bundle comprises two longitudinal peripheral and opposed zones where the densities in hollow fibres are at their **highest**: these two zones correspond to the start and finish of filling of the troughs 23. (Emphasis added).

In other words, Bovin in paragraph [0080] and FIG. 5 clearly shows that the bundles of hollow fibers have a higher density at the periphery compared with the density at the center. Unlike Bovin, in the present invention, the membrane-occupying rate at some portion (i.e., at the rest of the circumference of the hollow fiber membrane bundle within the non-neighboring region (B)) is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle. Therefore, Bovin fails to teach "the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle" as recited in claims 1, 2 and 12, and "the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle is not higher than the membrane-occupying rate at the center of the hollow fiber membrane bundle" as recited in claim 11.

In addition, Bovin discloses that the hollow fiber bundle has its highest densities at the outer periphery without suggesting that the density at different portions of the outer periphery is different. Therefore, Bovin also fails to teach "the membrane-occupying rate at the partial portion of the circumference of the hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle" as recited in claims 1, 2 and 12, and "the membrane-occupying rate at the partial portion of the circumference of the

hollow fiber membrane bundle is higher than the membrane-occupying rate at the rest of the circumference of the hollow fiber membrane bundle" as recited in claim 11.

With regard to the Examiner's reliance on the secondary references, these references have only been relied on for their teachings against some dependent claims. These references also fail to disclose the above combinations of elements as set forth in amended independent claims 1, 2, 11 and 12. Accordingly, these references fail to cure the deficiencies of Haworth and Bovin.

Accordingly, none of the utilized references individually or in combination teach or suggest the limitations of amended independent claims 1, 2, 11 and 12. Therefore, Applicant respectfully submits that amended independent claims 1, 2, 11 and 12 clearly define over the teachings of the utilized references.

In addition, claims 3-8 depend, either directly or indirectly, from independent claims 1 and 2, and are therefore allowable based on their respective dependence from independent claims 1 and 2, which are believed to be allowable.

In view of the above remarks, Applicant respectfully submits that claims 1-8, 11 and 12 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103 are respectfully requested.

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